INCLUSION OF URBAN LANDSCAPE IN A CLIMATE MODEL

How Can Satellite Data Help?

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Urban regions, which cover only approximately 0.2% of the earth's land surface, contain about half of the human population (UNPD 2001). Modeling urban weather and climate is critical for human welfare, but has been hampered for at least two reasons: i) no urban landscape has been included in global and regional climate models (GCMs and RCMs, respectively), and ii) detailed information on urban characteristics is hard to obtain. With the advance of satellite observations, adding urban schemes into climate models in order to scale projections of global/regional climate to urban areas becomes essential. Inclusion of urbanized landscape into climate models was discussed in depth at the fall American Geophysical Union (AGU) meeting of 2003 in the session entitled "Human-induced climate variations linked to urbanization: From observations to modeling," which took place on 12 December 2003 in San Francisco, California (most of the presentations of this session can be found online at www.atmos.umd.edu/~mjin/AGU03urban.html). The following notes summarize what is known and what needs to be advanced on this topic.

AGU MEETING SESSION—HUMAN-INDUCED CLIMATE VARIATIONS LINKED TO URBANIZATION: FROM OBSERVATIONS TO MODELING

What: The unique radiative characteristics of urban land cover are now being observed by satellites, with consequent improvements possible in surface schemes of climate models
When: 12 December 2003
Where: San Francisco, California

In a GCM and RCM, land physical processes are simulated in a land surface model, which is coupled with the atmosphere model through exchanges of heat fluxes, water, and momentum. Currently, an urban classification is not included in any major GCM/RCM land surface model [e.g., the second National Center for Atmospheric Research (NCAR) Community Land Model (CLM2), National Aeronautics and Space Administration (NASA) Global Modeling and Assimilation Office (GMAO) unified land surface model, Biosphere–Atmosphere Transfer Scheme (BATS), simple Biosphere model, version 2 (SIB2), etc.]. This exclusion makes GCMs/RCMs inadequate for realistically simulating urban modifications to climate.

The same land surface model can be coupled to a GCM or RCM. For example, the NCAR CLM is coupled to both the NCAR community atmosphere

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